Space Weather Forecast

Issued on Wednesday, 26 July 2023 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: CME arrived 25 Jul, with G1/Minor storms likely 26 Jul. R1/R2 blackouts likely 26 Jul with a chance throughout.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Two Moderate flares were observed, and there are 11 sunspot regions. Both flares were from a developing region on the northwest limb, which due to its position, is becoming difficult to analyse. The remaining regions remained stable or only decayed slightly. No Earth-directed CMEs (coronal mass ejections) were observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: CME arrival occurred at L1 at 24/2153 UTC with solar winds speeds, increasing from background to become elevated, peaking at 560 km/s. Interplanetary magnetic field (IMF), was initially weak rising to moderate, and close to strong values briefly, before a decline back to weak values. The north-south component was variable and weak at first, but with the CME became highly variable, including some peaks of moderately strong southward field (negative values). Geomagnetic activity was Quiet to Unsettled (Kp 1-3), but with a G1/Minor Storm interval observed 25/2100-2400 UTC with the CME arrival. A further Active interval was observed 26/0300-0600 UTC.

Energetic Particles / Solar Radiation: The observed count rate of high energy particles (high energy protons) increased in response to the far-sided large event on 24 Jul and continued to remain just above background on 25 Jul but declining. No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Low to Moderate activity is expected, with further M-class flares likely.

Solar Wind / Geomagnetic Activity: CME arrival on 24 Jul is potentially the very early arrival of a CME forecast to arrive later on 26 or 27 Jul, from a flare on 23 Jul. There are other potential sources of the enhancement observed however, and so a further arrival later 26 Jul or early 27 Jul cannot be completely ruled out. Otherwise a fats solar wind may connect on 28 Jul, however this is low confidence. Ongoing CME effects are likely to give Active to G1 Minor Storm intervals at first on 26 Jul. Any further enhancement will give a chance of further G1 Minor Storms. As CME influence recedes, likely during 27 Jul, mainly Quiet to Unsettled conditions are expected, rising again to Unsettled to Active, with a slight chance of G1 Minor Storms with any coronal hole enhancement on 28 Jul.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue declining towards background, although there remains a slight chance of the observed count rate increasing again from any significant flares that occur. Despite this, solar radiation storms are currently not expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	80	20	5	5
Strong	G3	No	5	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	50	40
Very Active	R3 to R5 X	No	10	10	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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